Landscape Definition Guide for SAP HANA® – Best Practices for a Successful Deployment
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To get the most out of the SAP HANA® business data platform, it is mission critical to outline a blueprint for its deployment. To achieve the best total cost of ownership (TCO) for an SAP HANA deployment, you must optimize management and operations costs by designing an efficient IT landscape. The following approach covers some best practices that may help you define the most suitable IT landscape for your deployment with regard to performance, scalability, adaptability, administration effort, and cost-effectiveness.

**SYSTEM LANDSCAPE AND PROJECT PLANNING**

A system landscape and project planning procedure for an SAP HANA deployment typically covers the following steps (see Figure 1):

1. Define the deployment options either in the data center (on premise) or in the cloud, per your business needs.
2. Define the general technical architecture – that is, the components required and the sizing for all components. Map the sizing results to your hardware.
3. Define the hardware acquisition requirements depending on your deployment model.
4. Define your cluster strategy (scale-up and scale-out) and number of systems.
5. Deploy different components and virtualization options for setting up each system.
6. Define a strategy for high availability and disaster recovery.
7. Define a software change management landscape and evaluate update options.

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**Figure 1: System Landscape and Project Planning Procedure for an SAP HANA Deployment**

On premise

Cloud

New hardware?

Yes

Appliance

Tailored data-center integration

No

Private, managed cloud

Public cloud

Sizing

Data volume management and cluster strategy

Technical deployment plan

Disaster-recovery and high-availability strategy

Virtualization, multiple components, one database and multiple components, one system, multitenancy

Software change management landscape

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Available **Deployment Models**

SAP HANA can be deployed in different ways. Here is an overview of all available options offered by SAP today. Each of them will be explained and mapped to applicable business scenarios.

**Options for deploying SAP HANA on premise in your data center include:**
- **Appliance** – Bare-metal single server or scale-out (see the “Define Your Cluster Strategy [Scale-Up or Scale-Out]” section) as a preconfigured validated stack, delivered together with the corresponding hardware
- **SAP HANA tailored data center integration** – Using the existing hardware and operations in your data center
- **Virtualized** – Hosting multiple, isolated database instances on one or more servers so that each database instance appears as if it is running on a separate machine
- **SAP HANA, Edge edition, advanced version** – Special package dedicated to small and midsize enterprises, delivered by SAP partners as an appliance or deployed using SAP HANA tailored data center integration
- **SAP HANA, express edition** – A streamlined version of SAP HANA that is available free of charge in a basic configuration and can run on laptops and other resource-constrained hosts

**Options for deploying SAP HANA in the cloud include:**
- **SAP® Cloud Platform, SAP HANA service** (or SAP HANA as a Service) – A fully managed cloud service, compatible with all SAP HANA deployments and tools; other SAP Cloud Platform services can be used in conjunction with the SAP HANA service to build and extend intelligent, mobile-enabled cloud applications
- **SAP HANA Enterprise Cloud** – An end-to-end private cloud service managed by SAP
- **SAP HANA deployed in a public cloud, as an infrastructure as a service (IaaS)** – Offering you the ability to run your own licensed SAP HANA software, including the advanced version of SAP HANA, Edge edition, on Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform, or IBM Cloud, as well as the SAP HANA One service on Alibaba Cloud (AliCloud)

Our implementation support team is happy to assist you in developing a business case for your SAP HANA journey and choosing the right deployment model that fits your needs exactly.

**WHICH DEPLOYMENT MODEL FOR WHICH BUSINESS SCENARIO?**
The following section maps the various deployment models for SAP HANA to the most typical business scenarios.

You may choose the **appliance offering** if you:
- Need to comply with industry-specific security, privacy, or control requirements (for example, in banking)
- Are looking for the fastest-possible implementation on premise
- Are looking for an all-inclusive prepackaged offering ready to run in your data center

You may choose the **SAP HANA tailored data center integration** if:
- Your business model requires running SAP HANA in your own data center
- You have already invested significantly in hardware, storage, and IT infrastructure
- You want to be more flexible in choosing and maintaining your hardware and infrastructure components

You may choose the **virtualization approach** if you:
- Want to make more efficient use of your existing hardware
- Want to be more flexible with regard to adaptation of new hardware requirements
You may choose the **express edition of SAP HANA** if you:
- Want to develop data-driven applications based on SAP HANA on your own computer or in the cloud
- Want to evaluate, prototype, or test-drive SAP HANA as a developer, partner, or student

You may choose **an SAP HANA managed service** if you:
- Are a net-new SAP HANA customer who does not want to set up a new data center or extend an existing one
- Lack qualified resources for operations and maintenance of SAP HANA or don’t want to invest in them
- Want to avoid high up-front investments in hardware and software licensing
- Want to extend your on-premise landscape with innovative applications delivered in the cloud
- Require instant provisioning
- Want to reduce your hardware footprint
- Need the ability to scale your SAP HANA instances elastically
- Wish to pay using a subscription or a pay-as-you-go system, versus traditional perpetual licensing

We offer two managed service offerings for SAP HANA, both of which are fully managed by SAP:
- **SAP Cloud Platform, SAP HANA service.** allows pay per use and subscription licensing and elastic scale. Start as small as 32 GB and scale elastically in 16 GB increments. Easily extend SAP applications using other services available in SAP Cloud Platform.
- **SAP HANA Enterprise Cloud** lets you run SAP workloads (such as applications on the SAP NetWeaver® technology platform) and offers subscription licensing.

You may choose **SAP Cloud Platform, SAP HANA service**, if you want to:
- Quickly build, extend, and integrate applications in a complete, cloud-based development environment based on SAP HANA
- Run your applications in the cloud of your choice through a single contract with SAP
- Scale your applications to support fluctuating workloads, and only pay for the capacity you use
- Develop cloud-native and hybrid applications easily while leveraging connectivity to services on third-party cloud platforms
- Use a hybrid approach in which on-premise and cloud deployments are combined. In such cases, specific requirements for data and process integration apply. The Cloud Integration Automation service for SAP Cloud Platform supports these tasks by providing process and data integration technology as a service to connect your cloud and on-premise enterprise systems in real time.

You may choose to deploy **SAP HANA in a public cloud**, as an IaaS, if you:
- Have your own SAP HANA licenses but want to use cloud infrastructure for flexible scalability
- Want to benefit from consumption-based pricing

Now let’s look at all these deployment options in more detail.
APPLIANCES FOR SAP HANA
SAP technology partners deliver SAP HANA software together with the corresponding validated hardware as a prepackaged solution to the customer site. The exact bills of materials for hardware components, the operating system, additional software components (such as a file system), and the SAP HANA software itself are provided by the technology partners.

SAP HANA runs on SUSE Linux Enterprise Server and Red Hat Enterprise Linux operating system–based platforms and on the IBM Power Systems hardware platform. For details and for choosing the right CPU versus memory ratio for your deployment, please refer to the various SAP notes and technical guidelines available through the SAP Support Portal service.

SAP HANA TAILORED DATA CENTER INTEGRATION
SAP HANA tailored data center integration offers an additional approach for deploying SAP HANA on premise. While the deployment of an appliance is easy and comfortable for customers, appliances impose limitations on the flexibility of selecting the hardware components for servers, storage, and networks.

SAP HANA tailored data center integration reduces hardware and operations costs by reusing existing hardware components and IT operations processes. It further mitigates risk and optimizes time to value by enabling existing IT management processes for an SAP HANA implementation. Finally, with SAP HANA tailored data center integration, you gain more flexibility in hardware selection for SAP HANA by being able to draw upon the existing SAP ecosystem and partners. SAP HANA tailored data center integration covers the following three hardware components of an SAP HANA installation that have potential for a more flexible and therefore more agile and cost-effective approach: server, enterprise storage, and enterprise network.

For more information on SAP HANA tailored data center integration, please refer to the document Deploy SAP HANA in the Way That Works Best for Your Business.

SAP HANA in Enterprise Networks
Most SAP HANA installations run in so-called enterprise networks to support backup and system replication requirements. SAP HANA tailored data center integration defines the requirements for the appropriate network devices and products. However, SAP does not introduce any certification of network components for SAP HANA tailored data center integration setups.

Customers may consider involving the SAP Digital Business Services organization to perform a go-live check for their SAP HANA installation prior to going live.
SAP HANA, EXPRESS EDITION
The express edition of SAP HANA can be installed on your laptop or desktop computer (Windows PC or Apple Macintosh), on Linux-based servers, or on a virtual machine (please note that there are specific requirements for virtual machines – read the “Decide on Data Tiering and Virtualization Options” section for more details). Alternatively, you can deploy it in various popular cloud platforms, using the SAP Cloud Appliance Library tool. Use the express edition to develop and deploy applications that use up to 32 GB of database memory for free. For more information and to download SAP HANA, express edition, visit www.sap.com/sap-hana-express. If additional memory is required, you can purchase it from SAP Store.

SAP CLOUD PLATFORM, SAP HANA SERVICE
SAP Cloud Platform, SAP HANA service, offers an advanced data platform technology that is fully managed across multiple clouds. It allows you to break cloud boundaries and barriers, innovate with live intelligence, and build business-ready solutions faster. You can deploy applications and data anywhere according to your business priorities, gain real-time insight on live data, and accelerate innovation.

To learn more, please read the solution brief Accelerate Innovation with a Fully Managed Data Platform Across Multiclouds.

SAP HANA ENTERPRISE CLOUD
SAP HANA Enterprise Cloud is a fully scalable and secure private cloud offering available only from SAP. It gives you the full power of SAP HANA in a private, managed cloud environment. The benefits include simplicity through rapid deployment, an integrated support model, and a comprehensive portfolio of innovative cloud solutions.

SAP HANA DEPLOYED IN A PUBLIC CLOUD AS AN IAAAS
Customers can quickly deploy and manage their prelicensed instance of SAP HANA as an IaaS on AWS, Microsoft Azure, Google Cloud Platform, or IBM Cloud without a hardware investment. Configurations ranging from 128 GB to 3 TB are available plus scale-out.

The express edition of SAP HANA can be installed on your computer, on Linux-based servers, or on a virtual machine.
Conduct Sizing of Your Hardware Components

Once you have selected your deployment model, it’s time to define your IT infrastructure requirements. SAP offers tools and procedures that help to determine the required hardware for exactly meeting your volume and performance requirements (see Figure 2). What makes sizing challenging is that, for in-memory databases, careful planning and maintenance have a much higher impact on cost of ownership than with traditional relational database management systems.

The most important sizing driver is the memory, while the second most important is the CPU. I/O sizing is also important but can only be performed during the realization phase. Apart from that, there is disk space required for persistence and log data, but this sizing is dependent on memory and thus straightforward.

For an initial sizing recommendation, you may proceed as follows:
2. Create a sizing project with the relevant information, such as number of users.
3. Get an initial sizing result for CPU, disk, and memory.
4. Possibly apply additional guidelines on top.
6. Provide your hardware vendor with the Quick Sizer tool project name and information, including whether classic Quick Sizer or Quick Sizer for SAP software was used.

There are detailed recommendations available from SAP experts, which are described in the guidelines Sizing Approaches for SAP HANA (login required). For a more general approach, please refer to the document How Can the Right Sizing Approach Help Maximize Performance and Lower TCO?
Define Your **Hardware Requirements**

To help you determine your hardware requirements, SAP offers a hardware configuration check tool for SAP HANA, which is a command-line tool used by storage vendors, SAP Support Portal, and customers. The tool measures the data throughput and latency times between the SAP HANA servers and the enterprise storage system. It does not require SAP HANA software to be installed beforehand and uses the same libraries for file system access and the same I/O patterns as SAP HANA does. Please note that, by using the hardware configuration check tool, you can run a self-assessment; however, there is no self-certification. Certifications for hardware components running SAP HANA software can be performed by the SAP Integration and Certification Center only.

Please also note that the exam required for the deployed support package stack for SAP HANA, or an appropriate delta exam, must be passed successfully to perform SAP HANA installations at customer sites. The courses that lead to this exam can be found at [https://training.sap.com](https://training.sap.com) and are typically called “SAP Certified Technology Associate...” with the respective SAP HANA edition as a suffix. You can prepare for this exam with the SAP training course “SAP HANA <release/SPS name> Installation and Administration.” Individual support agreements with your hardware partners are also required.

**CERTIFIED SAP HANA HARDWARE DIRECTORY**

The certified and supported [SAP HANA hardware directory](https://training.sap.com) (see Figure 3) provides the latest and most detailed information about the validated hardware platforms for SAP HANA software as well as for all enterprise storage offerings certified for use in IT landscapes running SAP HANA and using SAP HANA tailored data center integration. All servers offered through appliances, including [entry-level systems](https://training.sap.com) running Intel’s Xeon E5 v2/v3 CPUs and [IBM Power Systems](https://training.sap.com), are supported.

**INTEL OPTANE DC PERSISTENT MEMORY**

SAP HANA is the first major database platform to support Intel Optane DC persistent memory. Intel Optane DC persistent memory represents an entirely new way of managing data for demanding workloads. This revolutionary new generation of memory is nonvolatile, so SAP HANA does not have to completely reload all data from persistent storage to memory, and it runs at near-DRAM (dynamic random-access memory) speeds, maintaining today’s performance expectations. It also delivers greater data density than memory technologies, which enables additional innovation and simpler IT landscapes. Between its persistence, performance, and lower cost per gigabyte than conventional memory, Intel Optane DC persistent memory can help reduce TCO, reshape how businesses tier their data for database systems, and open up new use cases for the speed and power of SAP HANA.

For more information, read the document [Numerous Innovations, One Revolutionary Leap Forward](https://training.sap.com) from SAP partner Intel, or visit [www.sap.com/persistent-memory](https://training.sap.com).
Figure 3: Certified and Supported SAP HANA Hardware Directory

![SAP Certified and Supported SAP HANA Hardware Directory](image)

**Search Results**

Appliance configurations for scale-up DM/BWoH/BW4H can also be used for scale-up SoH/S4H. For further information see also Home -> tab: Details.

14 appliance models found certified, 16 TiB, 20 TiB, 18 TiB

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<th>Vendor</th>
<th>Model</th>
<th>CPUs min.</th>
<th>CPU Architecture</th>
<th>Appliance Type</th>
<th>Memory</th>
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<td>bullion S16</td>
<td>16</td>
<td>Intel Broadwell EX E7</td>
<td>Scale-out: S4H</td>
<td>16 TiB</td>
</tr>
<tr>
<td>Hewlett Packard Enterprise</td>
<td>HP Converged System 900</td>
<td>16</td>
<td>Intel Broadwell EX E7</td>
<td>Scale-up: SoH/S4H</td>
<td>16 TiB</td>
</tr>
<tr>
<td>Hewlett Packard Enterprise</td>
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<td>24</td>
<td>Intel Skylake SP</td>
<td>Scale-out: BWoH/BW4H</td>
<td>18 TiB</td>
</tr>
</tbody>
</table>
Define Your Cluster Strategy (Scale-Up or Scale-Out)

A typical single-server deployment of SAP HANA can vary from a 2 CPU configuration with 128 GB RAM as an entry-level system (see the certified and supported SAP HANA hardware directory for a complete list of available entry-level configurations provided by SAP technology partners) to a high-end 8 CPU configuration with 8 TB RAM (see Figure 4). Special layouts for SAP S/4HANA® support up to 20 TB per host and more. The largest single-server architecture for SAP HANA today runs at PayPal with 48 TB RAM.

If your data volume exceeds the volume applicable for single-server deployments, as detailed earlier, a scale-out configuration is the configuration of choice. A typical scale-out cluster consists of 2 to \( n \) servers per cluster, where in theory there is no limit for \( n \). The largest certified configuration is 112 servers, while the largest tested configuration has more than 250 servers. Each server configuration is either 4 CPU/2 TB or 8 CPU/4 TB. Both architectures, scale-up and scale-out, provide full support for high availability and disaster recovery (see the “Define a High-Availability and Disaster-Recovery Strategy and System Replication Requirements” section).

In a classical three-tier system architecture, with development, quality assurance (QA), and productive systems, you can apply lower hardware requirements for your development and QA systems and consolidate your server landscape by running your development and QA instance on the same physical server by applying the multi-tenancy and virtualization options SAP HANA has to offer (see the “Decide on Date Tiering and Virtualization Options” section).
UNDERSTAND THE BENEFITS OF SCALE-UP BEFORE YOU DECIDE TO SCALE OUT

A scale-out, multinode approach requires you to deploy multiple server boxes in your data center, which results in higher requirements for space and power. Further operational costs for cluster systems are higher than those for single-node systems. Although scale-out provides more hardware flexibility and requires less hardware costs initially, it also requires more up-front knowledge about data, application, and hardware than scale-up.

In summary, it is good practice to always scale up first and consider scaling out only if this is inevitable. Most customers find that the high data compression rate of SAP HANA combined with its high scalability (up to 2 TB with online analytical processing, and up to 12 TB with online transaction processing) will easily meet their business requirements. Its scalability constantly grows, spurred on by advances in multicore technologies, providing new ways to meet the most demanding scalability requirements of our largest customers.

Single-node SAP HANA deployments are recommended for data marts or accelerators with performance demands. For the impact of high-end CPU and memory components on the performance and energy consumption of servers running SAP HANA, please refer to the document Boosting the Performance of SAP S/4HANA and Analytical Banking Applications on SAP HANA.

It is good practice to always scale up first and consider scaling out only if this is inevitable.
Decide on Data Tiering and Virtualization Options

SAP HANA provides a variety of features that can help make your deployment even more effective, high performing, and cost-efficient, depending on the deployment model you chose.

COST-EFFECTIVELY MANAGE LARGE DATA VOLUMES WITH MULTITIER STORAGE
There are several efficient ways to manage large volumes of data using multitier storage.

Dynamic Tiering
With the SAP HANA dynamic tiering option, your frequently accessed data remains in-memory, while your rarely accessed data is moved to disk. This lets you cost-effectively manage large data volumes without being limited by memory size. Your applications can access all data independently of where it is stored, and you can modify your database storage preferences at any time to meet user expectations.

Extension Nodes
Leverage all functionality with warm data at lower cost through native SAP HANA extension node support with up to 4x warm data capacity. For more details, please see this technical overview document.

Virtualization
SAP HANA supports many popular virtualization supervisors, such as VMware vSphere 5.1 or newer, Hitachi LPAR, Huawei FusionSphere, IBM PowerVM, and others for nonproductive environments. You can choose virtualization for a wide variety of configurations, for single and multiple virtual machines, in single- or multinode configurations, for appliances of SAP HANA and SAP HANA tailored data center integration delivery methods (see Figure 5).

Multitier storage can help you lower TCO.
Figure 5: Virtualization Scenarios for Deployment of SAP HANA

- **Single virtual machine**
  - General support for a single SAP HANA virtual machine on a dedicated SAP HANA certified server in production

- **1x SAP HANA + other**
  - General support for a single SAP HANA virtual machine on a dedicated SAP HANA certified server in production (without overprovisioning and with resource priority configured over other virtual machines)

- **Multi-VM**
  - General support for multiple SAP HANA virtual machines on a single SAP HANA certified server in production

- **MCOS**
  - General support for a single or multiple SAP HANA virtual machines in combination with MCOS for production

- **Scale-out**
  - General support for SAP HANA scale-out configurations in a virtualized environment, either production or nonproduction

- **MCOS**
  - General support for multiple SAP HANA database installations in one system or OS in production

**VMware vSphere 6.x** supports scale-out and auto-failover configurations and a theoretical maximum virtual-machine size and configuration of 128 vCPUs and 4 TB vRAM. For detailed sizing recommendations, please refer to [www.sap.com/sizing](http://www.sap.com/sizing).

**Recommendations on Virtualizing SAP HANA Deployments**

Depending on performance requirements, number of users, and technical parameters, among other criteria, there are best practices in which virtualizing a deployment of SAP HANA is recommended and in which it is not. See Figure 6 for an overview.

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SAP Note 1995460
SAP Note 2063057**

SAP Note 2024433**
SAP Note 2063057**

SAP Note 1681092

*Windows guest OS is currently not supported with Hitachi LPAR for SAP® software workloads.
**Access to the SAP Notes tool is restricted to participants of controlled availability.

LPAR = Hitachi Compute Blade logical partitioning
MCOS = Multiple components, one system
RHEL = Red Hat Enterprise Linux
SLES = SUSE Linux Enterprise Server
VM = Virtual machine
Figure 6: Use Cases for SAP HANA Virtualization

- **Performance**
  - Performance critical

- **Financial**
  - Virtual machines
  - >512 GB of RAM*

- **Technical**
  - >64 virtual CPUs*
  - >1 TB of memory*

- **Users**
  - >500 named users (SAP® Business Suite)

- **Use Cases**
  - Mission-critical or high-performance scenarios
  - Absolute performance testing (end-to-end elapse time)
  - Scale-out or SAP HANA® host auto-failover (vSphere 6.x)
  - Central SAP software system (SAP Business Suite)

+ **Performance**
  - Nonperformance critical

- **Financial**
  - Virtual machines
  - ≤512 GB of RAM

- **Technical**
  - ≤64 virtual CPUs*
  - ≤1 TB of memory*

- **Users**
  - ≤500 named users (SAP Business Suite)

- **Use Cases**
  - Sandbox, trial systems, development, and test systems
  - Relative performance tests (old versus new version on virtual machine)
  - High-availability, disaster-recovery, tolerant system setup

*Relates to VMware vSphere 5.5 release

SAP HANA AND HYPERCONVERGED INFRASTRUCTURE (HCI)

Hyperconverged infrastructure (HCI) can significantly simplify data center design and allow new agility and scalability because it more closely couples previously separate components such as compute, storage, network, and other components by using software-defined solutions. With certification now available on HCIs, SAP and its ecosystem of technology partners deliver the next big step in driving down cost, increasing simplicity, and paving the way to the cloud.

HCI is an IT framework that combines compute, storage, network, and other components into a single system that reduces data center complexity and increases scalability. It includes a hypervisor for virtual compute nodes that typically run on commodity servers. In the future, HCI solutions may also leverage public IaaS solutions and will be a foundation for hybrid solutions managing on-premise and IaaS cloud deployments.

For an overview of all HCI partner solutions that are currently certified, please visit this [site](#).

SAP HANA AND SAP NETWEAVER APPLICATION SERVER DEPLOYED ON ONE SERVER

For all productive and nonproductive single-node installations, SAP HANA and the SAP NetWeaver Application Server component for Java or for ABAP® 7.4 or newer can be deployed on one server. However, this multicomponent and resource-optimized deployment approach is not recommended, because it limits flexibility.

MCOD AND MCOS

The multiple components, one database (MCOD) and multiple components, one system (MCOS) options give you the flexibility to optimally scale your architecture and the included components per your needs. While MCOD allows the joint usage of data pools across schemas and schema-overarching SQL statements, the advantage of MCOS is your ability to run various software versions of SAP HANA in the same environment.
Define a **High-Availability and Disaster-Recovery Strategy** and System Replication Requirements

High availability is a set of techniques, engineering practices, and design principles for business continuity. SAP HANA offers different kinds of high-availability mechanisms, supporting a broad range of scenarios for recovery from various faults – from simple software errors through system and hardware crashes up to disasters that decommission a whole data center.

The following four basic high-availability solutions are available:

- **Backup and recovery** – Regular shipping of data backups to a remote location over a network or by couriers can be a simple and relatively inexpensive way to prepare for a disaster.
- **Host auto-failover** – This covers hardware crashes for scale-out setups. One or more standby hosts are added to an SAP HANA system, usually within the same data center, and are configured to work in standby mode. The standby host has no access to data and does not accept requests and queries.
- **Storage replication** – The storage itself replicates all data to another location within one or between several data centers. The technology is vendor-specific hardware, and multiple concepts are available in the market.
- **System replication** – SAP HANA replicates all data to another location within one or between several data centers. The technology is independent from hardware vendor concepts and reusable with a changing infrastructure.

Depending on your data center operations, hardware configuration, and software landscape, you can select between several options for high-availability scenarios for your SAP HANA environment, including multitier or multitarget replications.

SAP works closely with hardware partners to provide customers a flexible choice between various best-suited hardware and software solutions for high-availability and disaster-recovery scenarios. Current capabilities include, for example, single-node failover with multiple standby servers within one cluster configuration and storage-based mirroring of SAP HANA system replication across data centers.

For a detailed description of all high-availability and disaster-recovery offerings available for SAP HANA, please refer to the document **Protect Enterprise Readiness with the High Availability Features of SAP HANA**.

SAP works closely with hardware partners to provide customers a flexible choice between different software solutions for high-availability and disaster-recovery scenarios.
**Change Management**

**Evaluate Update Options**
There are various options for updates.

**Zero-Downtime Maintenance**
Uptime is the most critical factor that influences the TCO of an IT organization. Therefore, system administrators are always looking to reduce downtime, be it incidentally by errors or crashes or planned for maintenance reasons. When running the system replication configuration for SAP HANA, zero-downtime maintenance allows you to make software updates or hardware exchanges with minimum downtime. This feature is based on the “connectivity suspend” feature of SAP NetWeaver for ABAP. For other environments, a near-zero-downtime option is available.

When applying zero-downtime maintenance, the shared library of the database interface decouples transaction management between ABAP and the SAP HANA database. This keeps transaction processing on the ABAP layer alive and allows you to change components (software versions) on the layers below on the secondary (shadow) instance of SAP HANA.

**Capture and Replay**
To safeguard business continuity, thorough testing is required prior to applying changes in your hardware or software configuration – be it new hardware, software updates, changes in configuration, table distribution, disk partitioning, or indexing. With the capture and replay tool for SAP HANA (see Figure 7), you can predict performance and the cost impact of updates to comply with service-level agreements and budget constraints. Plus, you can perform stability and performance checks to find root causes of system irregularities during normal operations.

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**Figure 7: Capture and Replay Tool for SAP HANA**

One integrated tool set and simulations based on real workloads

1. Capture workload
2. Preprocess workload
3. Replay workload
4. Analyze results

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The tool captures real system workloads and replays them in a separate testing environment rather than generating test data, so simulations are more accurate. Also, the tool fully integrates with SAP HANA and has an intuitive user interface based on the SAP Fiori® user experience to make managing and monitoring capture and replay processes easier.

And if you can’t afford or don’t want to pay for a separate testing environment for running your replay, a hybrid cloud service for SAP HANA can do this for you in a private cloud provided and managed by SAP.

For details, please refer to the document [Upgrade Your SAP HANA Platform with Capture and Replay Performance Management](#).

**SAP HANA Cockpit**
The SAP HANA cockpit is a tool built with SAP Fiori technology. It is your single point of access for various native administration tasks for SAP HANA. The cockpit provides a role-based concept that enables you to have a personalized view on the tiles and applications for each system administrator.

**SAP Landscape Management**
SAP Landscape Management software offers operations and automation features specifically for SAP HANA. For instance, provisioning and management of multitenant database containers is simplified. The setup for system replication – in particular, the procedure for takeover and failback – and the system refresh procedure using backup and restore are fully automated. SAP Landscape Management further provides a near-zero-downtime maintenance option for SAP HANA.

To learn more about SAP Landscape Management, visit us [online](#).

**TO LEARN MORE**
To find out more about how you can achieve a successful SAP HANA deployment, get in touch with your SAP representative or contact SAP [here](#).

The capture and replay tool for SAP HANA lets you predict performance and the cost impact of compliance updates. It also lets you perform stability and performance checks.